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EXAMINER

FENNEMA, ROBERT E

ART UNIT	PAPER NUMBER
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2183

MAIL DATE	DELIVERY MODE
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10/13/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/585,016	Applicant(s) ZHAO ET AL.	
	Examiner Robert Fennema	Art Unit 2183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-18 have been considered. Claim 1 amended as per Applicant's request.
2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/11/2009 has been entered.
3. Examiner notes the entry of the following papers:
 - Amendment filed 8/11/2009
4. There is a new Examiner of record for this case. Future correspondence should be addressed to Robert Fennema (contact information at the end of this action).

Drawings

5. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct

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any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 73. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

7. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, inserting an instruction after receiving an exiting signal from the command in the pipeline before it exists the pipeline must be shown, and new matter should be entered. Figure 5 seems to indicate that the "new" command, G, is inserted into the pipeline at the exact same time as the

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“old” command, A, and simply continues on its way when A exits the pipeline. There is no insertion of G into the pipeline when A exits, in fact, it appears that absolutely nothing happens except A’s exit, and A and G execute in parallel, which does not appear to be enabled by the Applicant’s disclosure, and would appear to be completely contrary to both the claims and the invention. Additionally, the drawings do not appear to currently show the exiting signal being released two stages before the new command enters the pipeline, nor do the drawings disclose the limitations of Claim 7.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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8. Additionally, Examiner notes that the first three "boxes" in Figure 5, in each of the first three "rows" is illegible. Letters are off-center, there are parenthesis seemingly at random, and it is difficult to discern what the Figure is attempting to show. Furthermore, "Time" appears to be labeling the vertical axis, which is already assigned to Pipeline stages. It is not clear if "Time" is supposed to be referring to the horizontal axis, or if it is referring to something else entirely. In addition, as noted above, Figure 5 appears to disclose features which are not only in direct contradiction with the claims, but the disclosed invention in the specification.

9. Figure 6 is also illegible, as the words in several of the boxes have been cut off. Replacement is required.

10. Examiner has further attached a notice from the PTO Draftsperson with additional informalities to be corrected.

Claim Objections

11. In Claim 1, it is unclear what Applicant is attempting claim with the limitation of "wherein a command exits the pipeline at a predetermine stage without passing through stages subsequent to the predetermined stage in the pipeline". The Applicants specification, in Paragraph 2, seems to indicate that in prior art machines, upon which the current invention is based, a command can "exit" the pipeline early in the third stage, but that command G cannot be inserted into the pipeline until command A has

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completely exited the cycle pipeline in stage six. However, if command A exited the pipeline early, then how can it be possible for it to exit again in the sixth stage without passing through the fourth, fifth, and sixth stages? Figure 5 (which has significant clarity issues as discussed above) does seem to show command A being entirely removed from the pipeline (although the specification does not particularly make clear if this is the case), however, this appears to show that there are at least three different interpretations of "exiting a pipeline" that can be applied, and it is not clear which one the claim is attempting to invoke. Examiner believes, and is interpreting the claim for the remainder of this action, that "exits the pipeline" refers to an instruction executing in a predetermined stage (for the final time), and that "without passing through stages subsequent to the predetermined stage" refers to the instruction essentially becoming a NOP and not executing any further in said subsequent stages (such as a branch calculating an address in the ALU stage, but not performing an action in memory or writeback stages), because it is not clear which definition of "exit" the Applicant intends to use. Given the multiple definitions present in the specification, the Examiner must use the broadest reasonable interpretation, which is that any of them are valid. In the very least, it appears that this limitation is claiming what Applicant has already admit as prior art, thus Examiner suggests clarification of the claim to more closely claim the inventive concept.

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12. In Claim 1, Line 9, "a initialization register" should read "an initialization register".

13. In Claim 2, Line 2, "is illegal command" should read "is an illegal command".

14. In Claim 3, Line 2, "incorrect command code" should read "an incorrect command code".

15. In Claim 7, Line 5, Examiner believes that "this field" is a poor choice of words, as it can lead to confusion as to which field is being referred to. Examiner suggests replacing "this field" with a recitation of exactly what field is being used, Examiner suggests replacing "this" with "the".

16. In Claim 8, Line 2, "the commands" lacks antecedent basis. Examiner believes it would be more appropriate to recite "each command", given the context of the claims.

17. In Claim 8, Line 2, Examiner suggests rephrasing "the entry to the pipeline", as while a pipeline inherently has an entry, it could appear to be a lack of antecedent basis. Examiner suggests using language similar to Claim 4, such as "required to provide an initial status of each command when each command enters the pipeline".

18. In Claim 9, Line 2, "said commands" lacks antecedent basis. Examiner believes it would be more appropriate to recite "each command", given the context of the claims.

19. In Claims 10, Line 2, "interface" should read "an interface".

20. In Claim 10, Line 7, "the command buffer controller" is unclear, as Applicant has previously established "command buffer controllers", thus, it is not clear which controller of the plurality of controllers Applicant is referring to, or if it is meant to be plural. Examiner is interpreting the claim to read "the command buffer controllers", but suggests the claim be amended to either recite "the command buffer controllers" or "one of the command buffer controllers", depending upon what Applicant intended to claim.

21. Claims 13-18 are substantially similar to Claim 10, and contain the same issues as Claim 10 that require correction.

Claim Rejections - 35 USC § 112

22. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

23. Claims 3, 5, 7-8, 10, and 13-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

24. In Claim 3, Line 2, "the instructions" lacks antecedent basis. Examiner will interpret the claim as "instructions" for the purpose of examination.

25. In Claim 5, Line 2, and Claim 12, Line 2, "the hardware processing module" lacks antecedent basis. Examiner will interpret it as "a hardware processing module" for the purpose of examination.

26. In Claim 7, Line 3, it is unclear if "the field" has antecedent basis. In Line 2, Applicant recites "...judged whether there is any field conflict...", however, it is not clear if the Applicant is attempting to establish both a field, and a conflict, or is establishing a "field conflict", despite no previous field being introduced in the claims. Examiner suggests that Applicant explicitly claim that the old and new commands contain a field, prior to introducing the field conflict, to more clearly claim the subject matter.

27. In Claim 7, Line 4, "the field branch" lacks antecedent basis". Examiner will interpret it as "a field branch" for the purpose of examination.

28. In Claim 8, Line 2, "the initial status" lacks antecedent basis, as there is no status of any type established in the claims. Examiner will interpret it as "an initial status" for the purpose of examination.

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29. In Claim 10, Lines 6 and 10, “processing unit of operator” does not make sense, it is not clear what “operator” is referring to. Clarification is required.

30. In Claim 10, Line 2, “the cycle pipeline structure” lacks antecedent basis. Examiner will interpret it was “a cycle pipeline structure” for the purpose of examination.

31. In Claim 10, Line 10, “the type” lacks antecedent basis. Examiner will interpret it as “a type” for the purpose of examination.

32. Claims 13-18 are substantially similar to Claim 10, and contain the same issues as Claim 10 that require correction.

Claim Rejections - 35 USC § 102

33. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

34. Claims 1, 4-10 and 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Hennessy et al. (“Computer Organization and Design, herein Hennessy”).

35. Regarding Claim 1, Hennessy teaches: An overlapping command submitting method of dynamic cycle pipeline, for a chip having a pipeline including a plurality of

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stages, wherein a command exits the pipeline at a predetermined stage without passing through stages subsequent to the predetermined stage in the pipeline (Branch instructions do not require use of the memory or writeback stages, thus “exit” at the execution stage, and no longer perform any functions thereafter), comprising the following steps:

- (a) reading the command from a command buffer and storing it in a command register (Page 499: reading from the instruction memory and storing in the IF/ID pipeline register);

- (b) decoding the command (Page 499; Page 450 Decode stage);

- (c) preprocessing operators of the command (Page 469 Fig. 6.29), preparing initial operators of each stage of the pipeline, and storing them into a initialization register (Page 499 storing in ID/EX pipeline register);

- (d) judging whether the pipeline is not full, if it is not full, directly inserting a new command (489-91 absent a stall, new instruction is automatically inserted), otherwise, waiting for an exiting signal from the command in the pipeline provided before a last cycle of the command exiting the pipeline (Page 492, Figure 6.46, the forwarding unit's control signals to the ALU mux inputs),

- (e) after receiving the exiting signal, judging whether there is command relevance between the new command to be inserted and an old command to exit, if yes, then inserting the new command after the old command exit (Pages 476-477, if instruction B depends upon instruction A, it must be inserted after instruction A exits); otherwise,

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performing a next step (if there is no dependency, then there is no need to stall and wait);

(f) when the old command is in the last cycle of the pipeline, submitting the new command to the pipeline (Page 481, Figure 6.37, a command can be entered into the pipeline as soon as the command upon which it depends has its result (in its last cycle)).

36. Regarding Claim 4, Hennessy teaches: The command submitting method of Claim 1, wherein the exiting signal is released two stages before the new command enters the pipeline stage (Page 492, the forwarding from memory to the ALU stage a 2-stage difference).

37. Regarding Claim 5, Hennessy teaches: The command submitting method of Claim 1, wherein the command relevance means that the new command and the old command cannot share the hardware processing module in the same pipeline stage (Pages 476-477).

38. Regarding Claim 6, Hennessy teaches: The command submitting method of Claim 1, wherein in the Step (e), it is also judged in which stage of the pipeline field switch shall be conducted for the new and old commands, and the field switch is completed in the corresponding pipeline stage where the new and old commands

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overlaps (Pages 476-479 and 492, the forwarding logic has to choose the appropriate feedback path).

39. Regarding Claim 7, Hennessy teaches: The command submitting method of Claim 1, wherein in the Step (e), it is also judged whether there is any field conflict between the new command and the old command, if there is, then the field of the new command is added into the pipeline when submitting (Page 478, forwarding), and the field of the old command enters into the field branch and maintains in the field branch until the last time that the old command uses this field (the data being forwarded from the old command to the new command is still stored in a register of the old command until it leaves the pipeline); in case there is no field conflict, the field switch is conducted in the corresponding pipeline stage after submitting (Page 466, the value is read from the register file if there is no required forwarding).

40. Regarding Claim 8, Hennessy teaches: The command submitting method of Claim 1, characterized wherein in the Step (c), it is required to provide the initial status of all kinds of commands at the entry to the pipeline (Page 469 Fig. 6.29 -- every instruction has its initial status provided).

41. Regarding Claim 9, Hennessy teaches: The command submitting method of Claim 1, wherein the said commands include reading/writing memory commands (MIPs data transfer instructions), reading/writing control register commands (MIPs move

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instructions) and various searching commands (MIPs Arithmetic Instructions that search for operands; moreover, all instructions can be used as part of searching algorithms).

42. Regarding Claim 10, Hennessy teaches: A chip on which the method according to Claim 1, is carried out having the cycle pipeline structure, comprising: interface of host computer (Page 499), input buffer (IF/ID pipeline register), command processing unit (Control), and result unit (Write Back Stage); the command processing unit comprises: command interpreter (Multiplexers receiving control signals & ALU control) and pipeline performing unit (anything in 499); characterized in that the command interpreter further comprises: command buffer controllers (pipeline registers), command register (portion of IF/ID pipeline register holding opcodes), processing unit of operator (ALU control), pipeline initialization register and control automaton (EX/ME pipeline register/ALU control), which are connected in order; the control automaton controls the command buffer controller to read a command from the command buffer (ALU control completes this), and stores the command into the command register; the control automaton decodes the command (Decode stage), and controls the processing unit of operator to prepare initial operators of each pipeline stage according to the type of the command, and stores them into the pipeline initialization register (499).

43. Claims 15-18 are substantially similar to Claim 10, and are rejected for the same reasons set forth in the Claim 10 rejection above.

Claim Rejections - 35 USC § 103

44. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

45. Claims 2, 3, and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hennessy, further in view of Vaglica (U.S. Patent No. 5,084,814).

46. Regarding Claim 2, Hennessy teaches: The method of Claim 1, but fails to teach: wherein the Step (b) also includes a step of judging whether there is illegal command, if there is, then deleting the illegal command and returning to Step (a), otherwise, conducting the next step.

Vaglica discloses an illegal instruction detector and going to the next instruction if such a detection is made (Column 9, Lines 48-68).

Hennessy is silent towards any detection of illegal commands, and deleting them. However, Vaglica discloses a breakpoint system in which there is an illegal instruction detector, which allows the system to ignore the illegal instruction, and to instead execute the next instruction (Column 9, Lines 63-68). Vaglica further discloses that this detector provides several advantages, such as better data support features without requiring significant size for a debugging unit (Column 1, Lines 50-65). Given this advantage, one of ordinary skill in the art would have been motivated to implement a

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system which can detect illegal instructions, and perform a variety of steps as a result of it, including deleting and ignoring it.

47. Regarding Claim 3, Vaglica teaches: The command submitting method of Claim 2, wherein said illegal command includes: the instructions with incorrect command code and/or carrying unreasonable command parameters (Column 9, Lines 48-68).

48. Regarding Claim 11, Hennessy teaches: The command submitting method of Claim 2, wherein the exiting signal is released two stages before the new command enters the pipeline (Page 492, the forwarding from memory to the ALU stage a 2-stage difference).

49. Regarding Claim 12, Hennessy teaches: The command submitting method of Claim 2, wherein the command relevance means that the new command and the old command cannot share the hardware processing module in the same pipeline stage (Pages 476-477).

50. Claims 13 and 14 are substantially similar to Claim 10 (but depending upon Claims 2 and 3 respectively), and are taught by Hennessy for the reasons disclosed in the Claim 10 rejection above.

Response to Arguments

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51. Examiner has considered the Applicant's arguments in light of the amendments to the claims, but finds the arguments non-persuasive. As explained in the 112 rejection of the claims, it is very unclear what is actually being claimed in regards to "exiting" the pipeline, either the Applicant appears to be claiming what the Applicant admits is prior art, and thus not patentable, or the Applicant is claiming one of a number of different interpretations of "exit", all but one of which Hennessy teaches, given the lack of clarity, Examiner must take the broadest reasonable interpretation, which is that any of them are valid. Furthermore, Examiner believes that Hennessy teaches the claimed limitation of judging a command relevance, and inserting the new command after receiving an exit signal, in Hennessy's disclosure of forwarding operands. Applicant's discussion that Hennessy creates bubbles, while the current invention removes them appears to be immaterial, as Examiner does not see how this particular issue is represented in the claims.

52. Examiner also notes that the 103 rejections in view of Kawasaki has been withdrawn, and replaced by a 102 with Hennessy alone. In interpreting the claims, the Examiner believes that the previous Examiner read Hennessy or the claims too narrowly, and that it was not necessary for Kawasaki to be combined with Hennessy to teach the currently claimed limitations.

53. However, Examiner does have several suggestions to overcome the current rejection. Obviously, a clarification of what "exit" actually means would be helpful, but

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Examiner believes that the subject matter of Claim 7, and discussed in more detail in the description of Figure 7 in the specification, in regard to the field branch hardware, could overcome Hennessy. However, Examiner believes that Claim 7, as currently written, is very confusing, and does not indicate the function of the "field branch", or other components, however, if claimed clearly, and in the level of detail currently found in the specification, Examiner believes that that disclosure would almost certainly overcome the current rejection.

54. If the Applicant has any questions about this action, or wishes to discuss any potential amendments to the claims, Applicant is welcome to contact the Examiner to set up an interview, and Examiner will attempt to help the Applicant craft claim language that will overcome the current rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Fennema whose telephone number is (571)272-2748. The examiner can normally be reached on Monday-Thursday, 9:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (571) 272-4162. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert Fennema/
Examiner
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